NASA and ESE Overview

Presentation to ESSAAC

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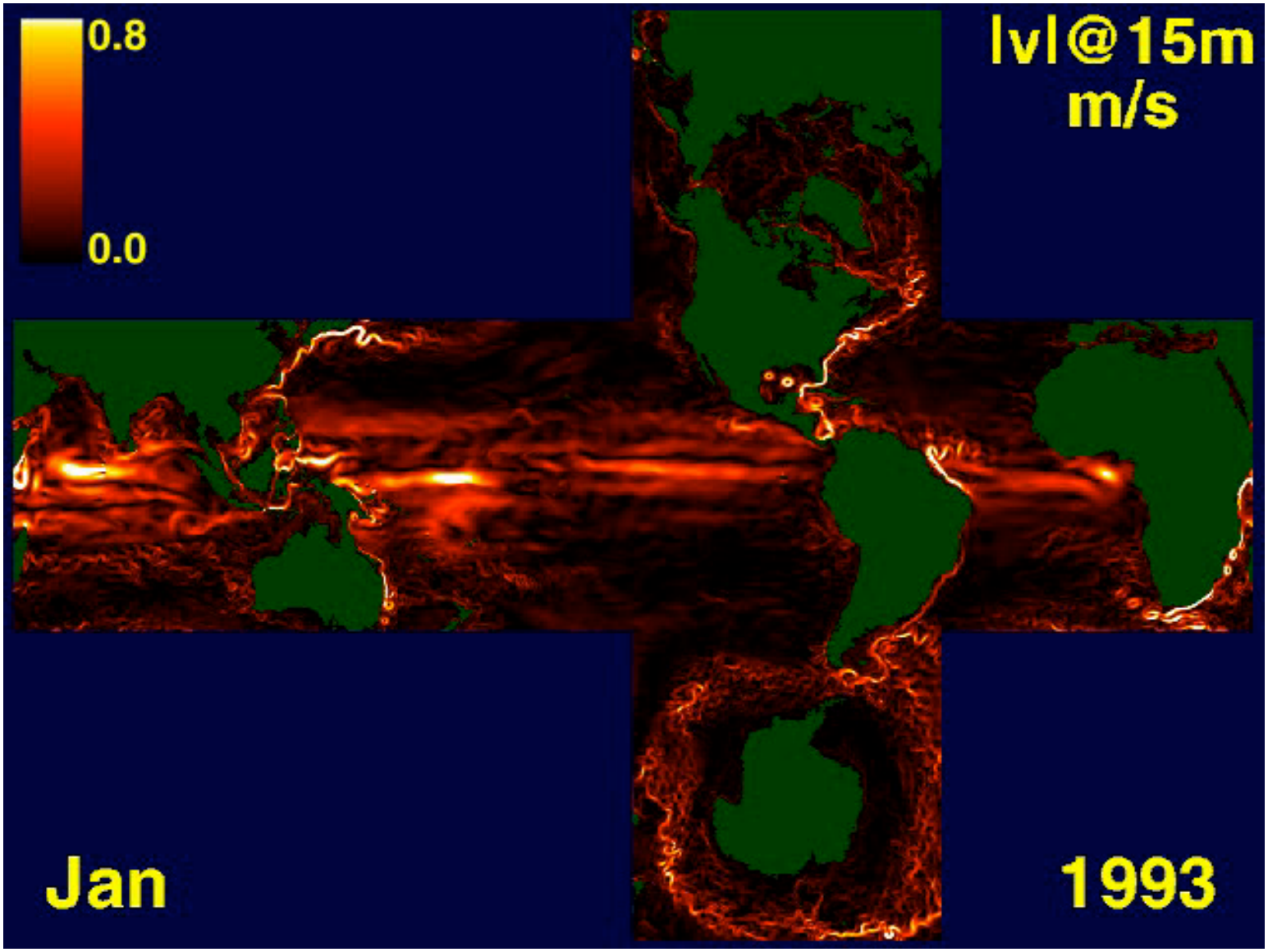
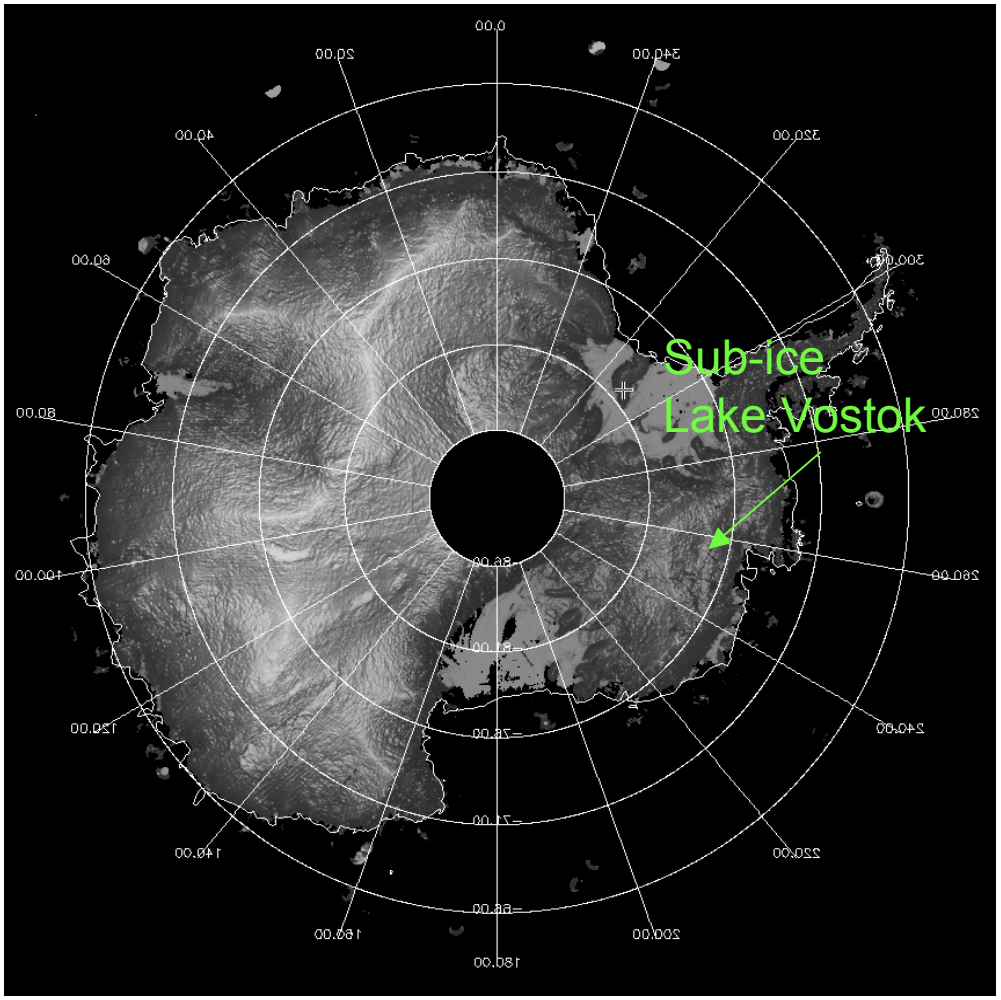
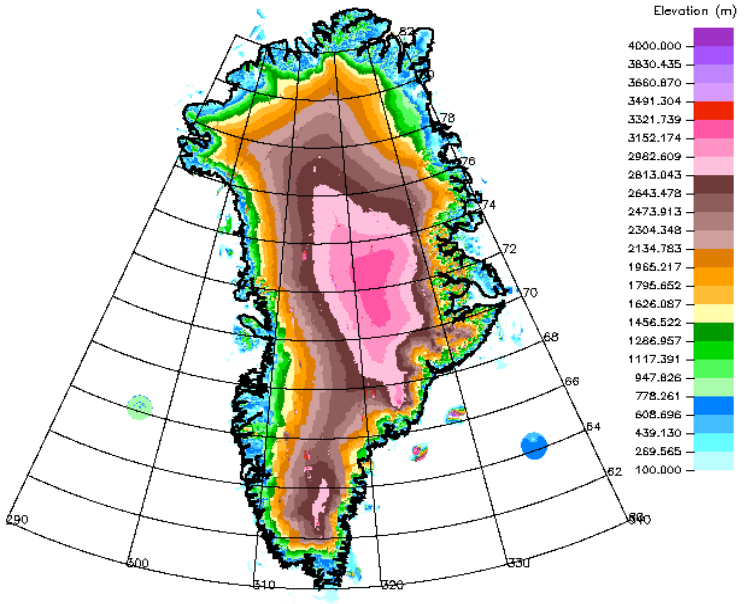
ECCO Global Ocean Simulation



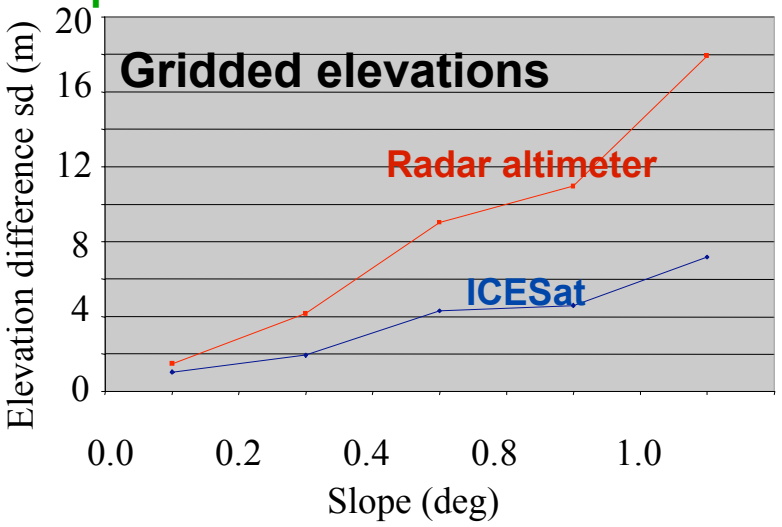
Ice Sheet Elevation Maps from ICESat



Antarctic shaded elevation map



Comparison with aircraft laser altimeter



Strategic Alignment of Sponsored Research

- **In the last year or so, the Research Program has issued NRAs resulting in grants totaling about $170M, or about one-third of the program. Increasingly, these are align with the six Science Focus Areas. Recent NRAs include:**
  - EOS Recompetition
  - Interdisciplinary Science (IDS)
  - Radiation/Chemistry/Climate
  - Precipitation
  - Oceans & Ice
  - Carbon Cycle

- **Over the past two years, the Applications Program has been winding down grants from the heritage program and issuing solicitation consistent with the adoption of 12 applications of national priority. This process should be complete in the coming year**

Status of Selected Missions

- Aqua being shipped to VAFB on Feb. 20 for planned June launch
  - HIRDLS experiencing a short circuit in the cooler counter-balancer mechanism; after review, decision taken to launch as is
- Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) Payload was shipped to the spacecraft manufacturing facility, Alcatel Space, in Cannes, France, on February 11, 2004.
- Cloudsat bus ready; instrument high voltage power supply requires redesign of two subassemblies thru June
- The combined CloudSat and CALIPSO launch is planned for the 2nd quarter of CY2005.
- NPOESS Preparatory Project on track for late 2006 launch
- Nearing completion of programmatic arrangements to add wide-swath capability to the Ocean Surface Topography Misssion
- Orbiting Carbon Observatory, Aquarius, and Hydros authorized to enter into formulation

Landsat Data Continuity Mission

- Under the direction of the Executive Office of the President, NASA is leading the Interagency Working Group (IWG) to assess options available to provide Landsat data continuity on a sustainable basis. IWG membership includes NASA, NOAA, USGS, NGA, and NRO

- Options include USG owned/operated Landsat system, combining Landsat with NPOESS, or competitively procuring mission to meet US Government medium resolution requirements

- Integration of Operational Land Imager (OLI) on NPOESS platform seems promising over the long term
  - NPOESS provides an opportunity for Landsat transition to operations
  - Most viable long-term sustainability of Landsat data
  - Provides cost-effective solution to long-term data continuity, maximizing existing government assets

LDCM

- High probability of a data gap necessitates a bridge mission as gap filler
  - Reduction of data gap risk
  - Maximizes continuation of national and scientific research needs
  - Risk reduction for Land Imager in NPOESS orbit

- Current Assessment Study expected to be completed in May
  - Technical requirements for OLI will be better understood
  - **Potential solicitation from multi-agency to seek proposals for spacecraft, OLI, other complimentary payloads, ground system implementation, etc.**

NASA's Vision for Space Exploration

Key Elements of New Space Policy

- **Space Shuttle**
  - Return the Space Shuttle to flight and plan to retire it, following the completion of its role in the construction of the International Space Station by the end of this decade

- **International Space Station**
  - Complete assembly,
  - Refocus research to exploration factors affecting astronaut health, and
  - Acquire crew and cargo systems, as necessary, during and after availability of Shuttle.

- **Crew Exploration Vehicle**
  - Develop a CEV to travel beyond low Earth orbit, the first new U.S. human space flight vehicle since the 1980s.
  - Undertake first automated test flight by the end of this decade in order to provide an operational capability to support human exploration missions no later than 2014.

- **Lunar Exploration**
  - Begin a series of robotic missions to the Moon by 2008, followed by a period of evaluating lunar resources and technologies for exploration.
  - Begin human expeditions to the Moon in the 2015 – 2020 timeframe.

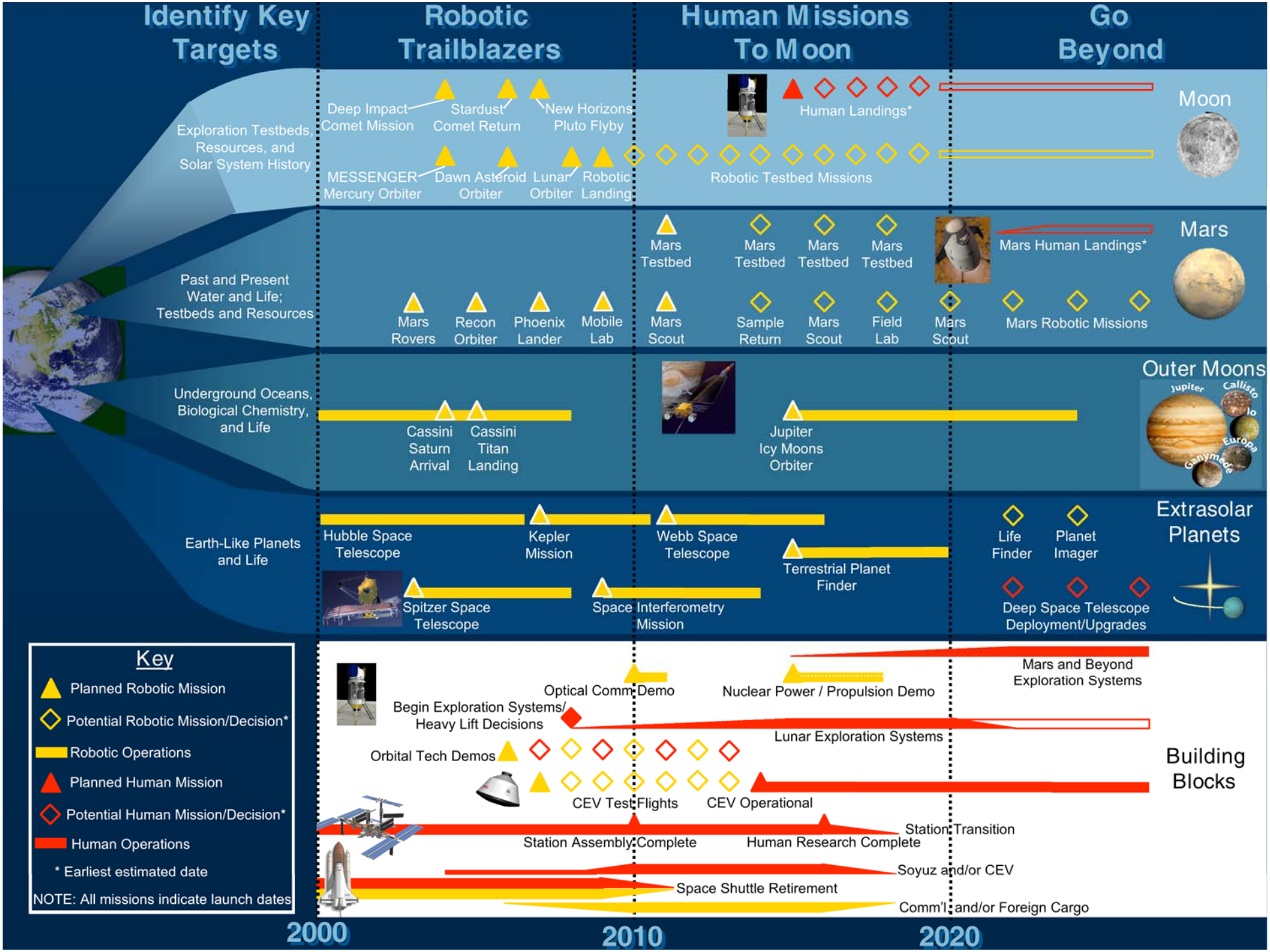
Key Elements of New Space Policy (cont.)

- **Mars Exploration**
  - Conduct robotic exploration of Mars to search for evidence of life, to understand the history of the solar system, and to prepare for future human exploration.
  - Timing of human missions to Mars based on available budget, experience and knowledge gained from lunar exploration, discoveries by robotic missions at Mars and other solar system locations, and development of required technologies and know-how.

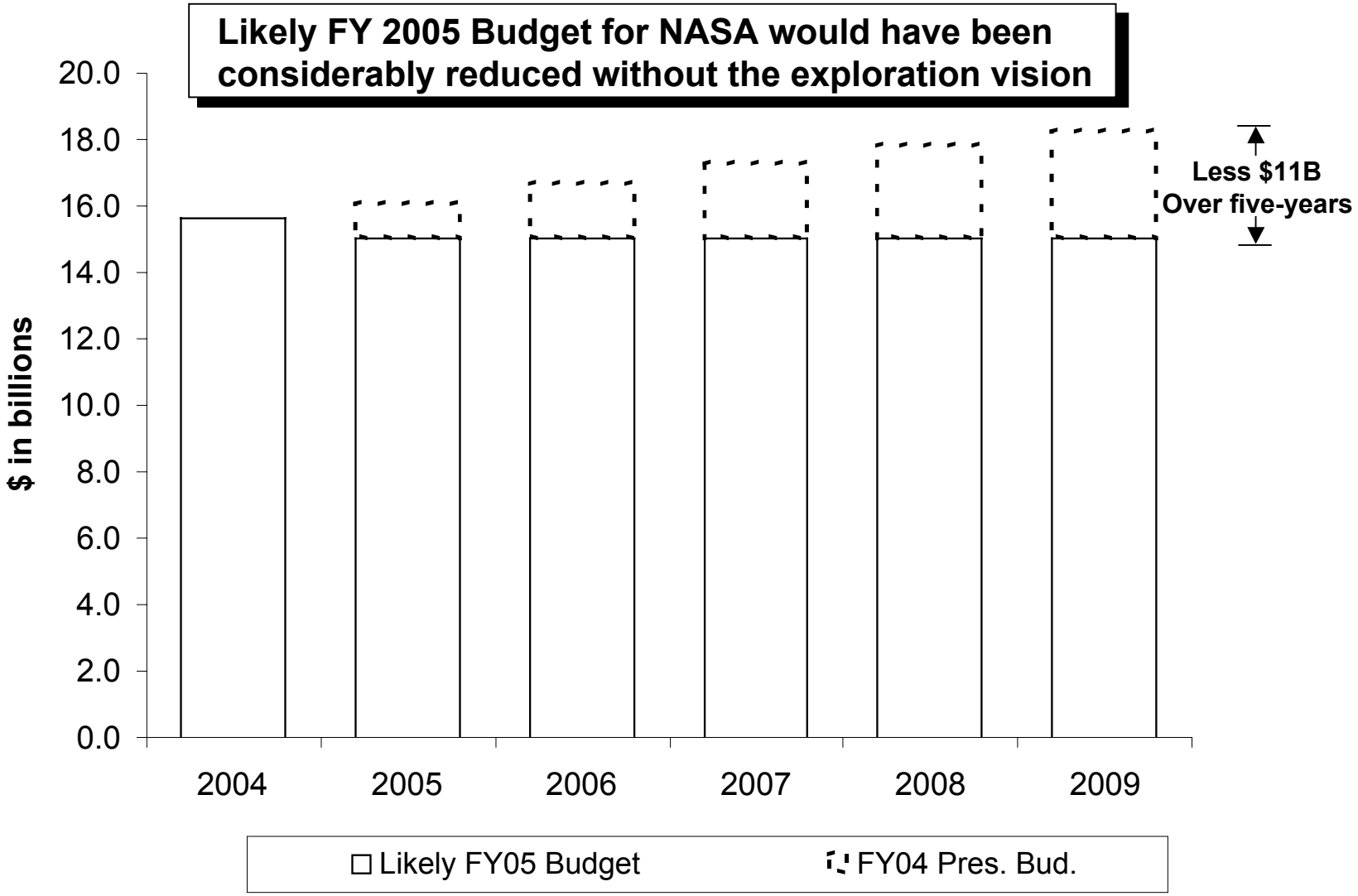
- **Other Solar System Exploration**
  - Conduct robotic exploration across the solar system for scientific purposes and to support human exploration.
  - In particular, explore Jupiter's moons, asteroids and other bodies to search for evidence of life, to understand the history of the solar system, and to search for resources;

- **Exploration Beyond**
  - Conduct advanced telescope searches for Earth-like planets and habitable environments around other stars;

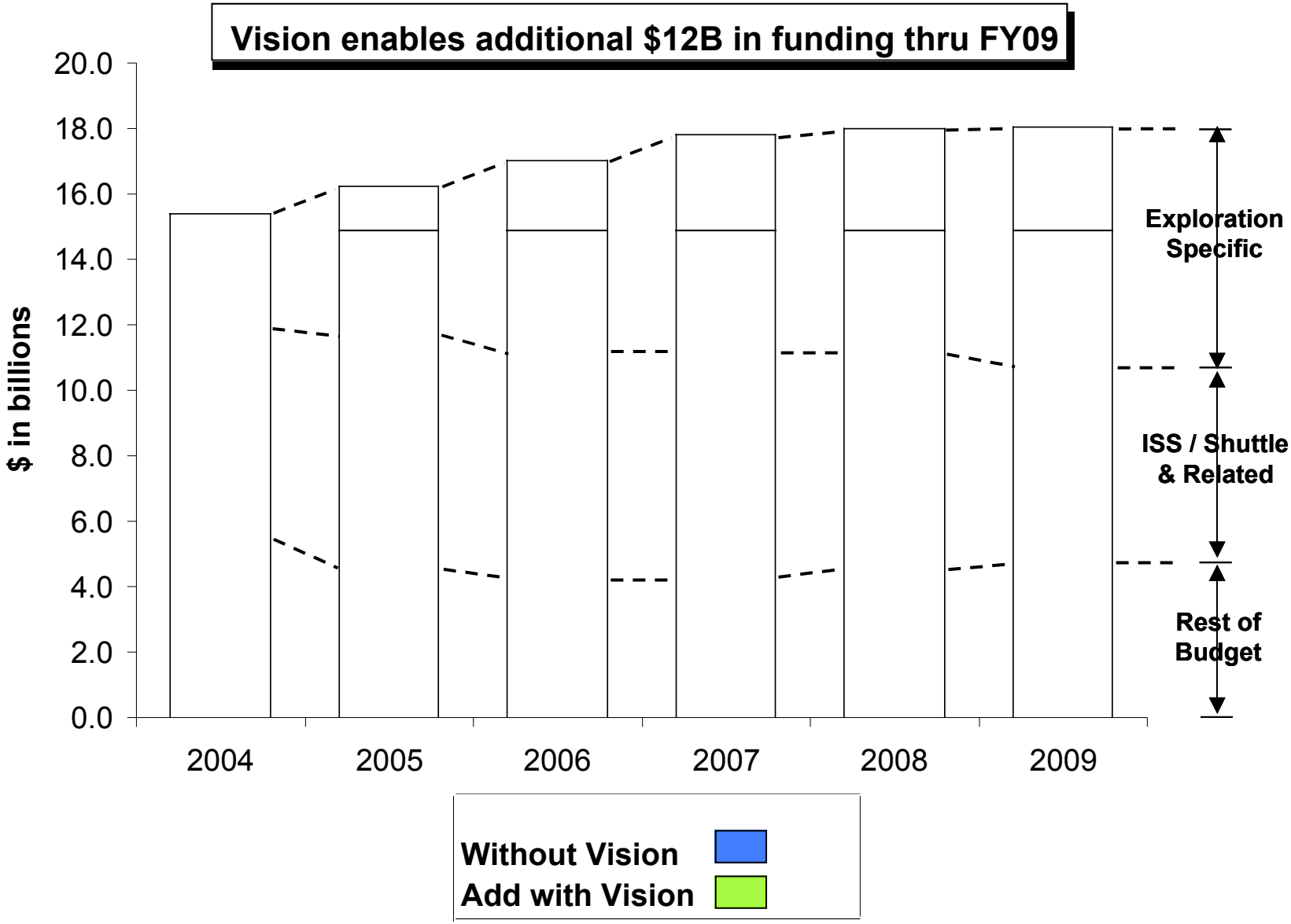
- **Enabling Capabilities**
  - Develop and demonstrate power generation, propulsion, life support, and other key capabilities required to support more distant, more capable, and/or longer duration human and robotic exploration of Mars and other destinations.
  - Separate to the maximum practical extent crew from cargo launches


Identify Key Targets
Robotic Trailblazers
Human Missions To Moon
Go Beyond
Exploration Testbeds, Resources, and Solar System History
Deep Impact Comet Mission
Stardust Comet Return
New Horizons Pluto Flyby
MESSENGER Mercury Orbiter
Dawn Asteroid Orbiter
Lunar Orbiter
Robotic Landing
Human Landings*
Robotic Testbed Missions
Moon
Past and Present Water and Life; Testbeds and Resources
Mars Rovers
Recon Orbiter
Phoenix Lander
Mobile Lab
Mars Testbed
Mars Scout
Sample Return
Mars Testbed
Mars Scout
Mars Testbed
Field Lab
Mars Testbed
Mars Scout
Mars Human Landings*
Mars Robotic Missions
Mars
Underground Oceans, Biological Chemistry, and Life
Cassini Saturn Arrival
Cassini Titan Landing
Jupiter Icy Moons Orbiter
Outer Moons
Earth-Like Planets and Life
Hubble Space Telescope
Kepler Mission
Webb Space Telescope
Terrestrial Planet Finder
Spitzer Space Telescope
Space Interferometry Mission
Life Finder
Planet Imager
Deep Space Telescope Deployment/Upgrades
Extrasolar Planets
Key
Planned Robotic Mission
Potential Robotic Mission/Decision*
Robotic Operations
Planned Human Mission
Potential Human Mission/Decision*
Human Operations
* Earliest estimated date
NOTE: All missions indicate launch dates
Optical Comm Demo
Nuclear Power / Propulsion Demo
Mars and Beyond Exploration Systems
Begin Exploration Systems/ Heavy Lift Decisions
Lunar Exploration Systems
Orbital Tech Demos
CEV Test Flights
CEV Operational
Building Blocks
Station Assembly Complete
Human Research Complete
Station Transition
Soyuz and/or CEV
Space Shuttle Retirement
Comm'l and/or Foreign Cargo
2000
2010
2020

Facing Major Cuts Without the New Vision



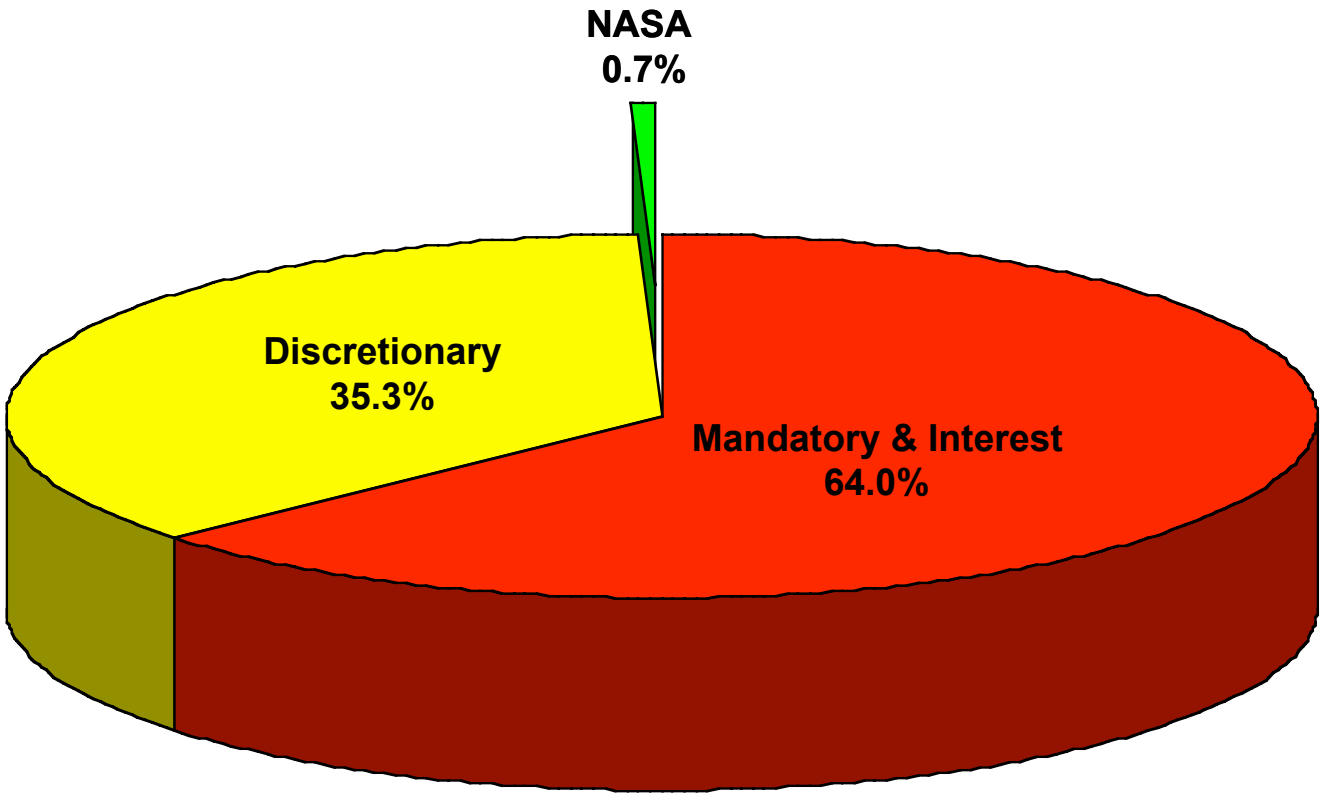
Budget with Approved Exploration Vision



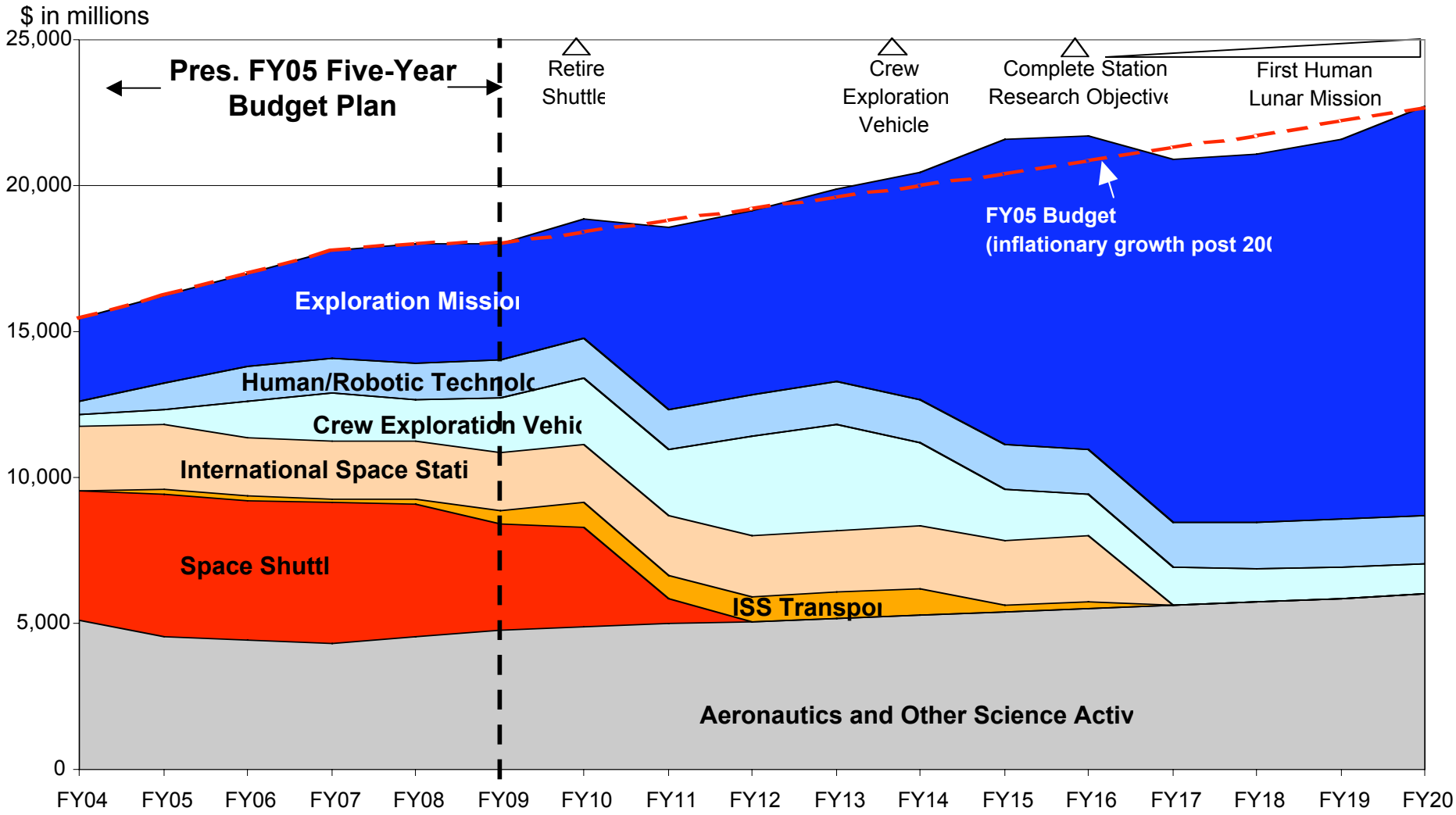
Affordable Budget Plan

NASA's Budget fits within the President's overall plan to cut the deficit in half in five years and limit overall discretionary growth to 4%

Total Federal Budget



Strategy Based on Long-Term Affordability



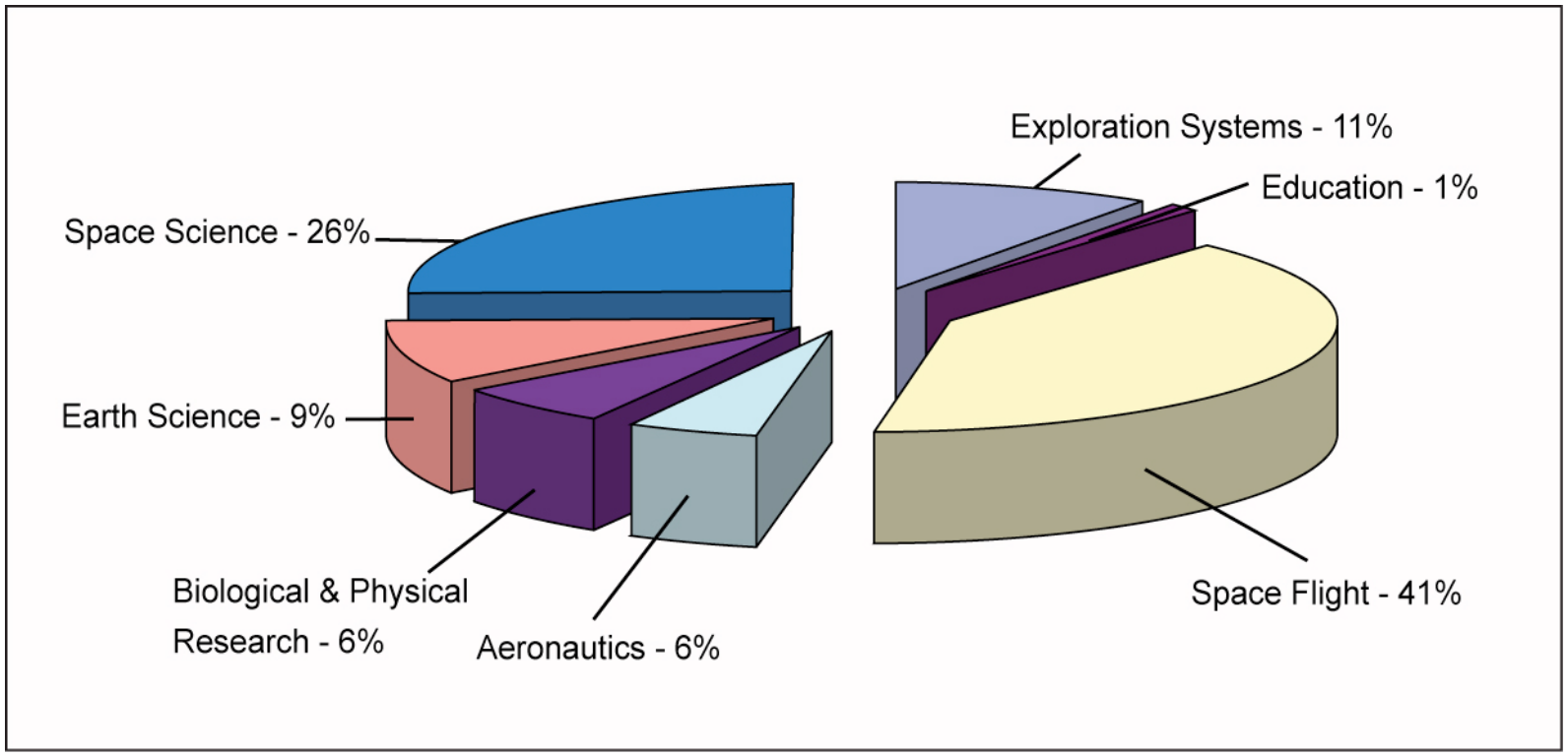
NOTE: Exploration missions – Robotic and eventual human missions to Moon, Mars, and beyond
Human/Robotic Technology – Technologies to enable development of exploration space systems
Crew Exploration Vehicle – Transportation vehicle for human explorers
ISS Transport – US and foreign launch systems to support Space Station needs especially after Shuttle retirement

Agency Budget Summary

$ In Millions	FY 2004 *	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Space Science	3,943	**4,138**	4,404	4,906	5,520	5,561
Earth Science	1,526	**1,485**	1,390	1,368	1,343	1,474
Biological & Physical Research	965	**1,049**	950	938	941	944
Aeronautics	946	**919**	957	938	926	942
Education	164	**169**	169	171	170	170
New **Exploration Systems**	1,563	**1,782**	2,579	2,941	2,809	3,313
Space Flight	5,857	**6,674**	6,525	6,524	6,261	5,598
Earmarks	388					
TOTAL NASA	**15,378**	**16,244**	**17,002**	**17,815**	**18,001**	**18,034**
year to year growth		5.6%	4.7%	4.8%	1.0%	0.2%

* - FY 2004 budget displays enacted less earmarks

ESE in the FY05 NASA Budget



Research

- **Increases commensurate with availability of new data from recently launched missions**
- **Level funded from FY06-09**

	FY04	FY05
	523.4	**560**
R&A / EOS Science	282.5	289.9
Mission Science Teams	190.6	217.0
Computing	14.9	16.2
Suborbital	35.4	36.9

Observing & Information Systems

- **Continues development of NPP, Ocean topography, Landsat data continuity, Cloudsat, Calipso, Orbiting Carbon Observatory, Aquarius, and Glory**
- **Defers GPM two years**
- **Defers Ocean Winds indefinitely pending assessment of impact of loss of Adeos II and science utility of Coriolis (passive measurement approach)**
- **Future ESSP mission funding deferred one year;**
  - AO-4 release remains targeted for FY04; selection to include risk reduction period
  - Hydros ramp up tied to future ESSP funding

	FY04	FY05
	875.3	**789.5**
Missions in Development	252.7	202.2
EOSDIS	98.3	40.2
Missions in Formulation	202.1	239.9
Operations	322.2	307.2

Advanced Technology

- **Instrument Incubator, Advanced Technology Initiative, and Advanced Information Systems Technology unaffected in FY05; level funded in FY06-09**

- **Computational technology (old HPCC program) phases out**

- **New Millennium Program phases out in FY06**

FY04	FY05
78.9	59.0

Applications & Education

- **Implementation of 12 national applications with partner agencies on-going; early results are in**
- **Education program continues as aligned with NASA Education Enterprise**
- **Applications & Education program level funded in FY06-09**

	FY04	FY05
	74.8	**77.0**
National Applications	24.0	21.8
Education	20.8	23.1
Cross Cutting Solutions	30.0	32.1

Earth Science

The President's budget request for FY05 includes:

- $54 million for the Climate Change Research Initiative, making NASA the largest contributor to the interagency Climate Change Science Program (CCSP)
- $141 million for development of the NPOESS Preparatory Project (NPP), 36% above FY04
- $42 million to maintain critical work on Landsat continuity
- $560 million for research, 7% above FY04, allowing research on data from 80 sensors on 18 operating satellites
- $240 million for missions in formulation, a 37% increase from FY 2004, including such missions as Orbiting Carbon Observatory, Aquarius, Hydros and Glory

$ In Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Earth Science	**1,526**	**1,485**	**1,390**	**1,368**	**1,343**	**1,474**
Earth System Science	1,451	1,409	1,313	1,290	1,266	1,397
Earth Science Applications	74	77	77	77	77	77

Note: FY04 does not include earmarks

ESE Budget Summary

- **Preserving a robust Earth Science program**
  - Completing EOS first series and implementing continuity missions with partners; mission development budget ramps down accordingly
  - Missions in formulation (Ocean topography, OCO, Aquarius, etc.) beginning to ramp up
  - EOSDIS becoming more efficient with EMD contract
  - Research program growing commensurate with availability new data from new missions
  - Applications program level funded beyond FY05
  - Continuing commitments to CCSP, international GEO and related cooperative programs

- **Contributing to NASA's Exploration Vision**
  - Financially: $1.1 billion over FY05-09
  - Expertise in studying planetary systems, managing large data volumes, integration of diverse data types, creating new instrument technologies, formation flying of multiple satellites